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भारतीय मानक

बायोगैस (बायोमीथेन) — विशिष्टि

Indian Standard

BIOGAS (BIOMETHANE) — SPECIFICATION

ICS 75.060

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

February 2013 **Price Group 1**

Petroleum, Lubricants and Their Related Products Sectional Committee, PCD 3

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Petroleum, Lubricants and Their Related Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

The purpose of this standard is to provide general guidelines for the biogas (biomethane) composition, quality parameters and for biogas (biomethane) thermal application, applications in stationary engines, automotive applications and supply through piped network.

Biogas (biomethane) as a fuel, meeting the requirements of the compositional standards, should,

a) provide the safe operation of the engine whether stationary or automotive and associated equipments;
b) protect the fuel system from the detrimental effects of corrosion, poisoning and liquid or solid deposition; and
c) not emit any pollutants or the greenhouse gases after combustion, beyond prescribed limit.

Biogas (biomethane) is primarily methane gas which is generated from an anaerobic digestion of organic wastes by micro organisms. It is a relatively simple and economical method to produce a fuel from waste. While technically biogas (biomethane) can be produced from any type of organic material, most times, biogas (biomethane) is produced from organic waste. This waste could comprise agricultural and crop waste, human waste and animal waste (cow dung for instance). Biogas (biomethane) is an environment friendly, clean, cheap and versatile fuel which can be used for various applications.

Biogas (biomethane) is a natural product produced from the biodegradable substrates like cattle dung, poultry waste, food waste, sewage waste etc. It has methane as the main component around 50-70 percent, CO_2 around 30-40 percent and H_2S and moisture in trace quantities. It varies in composition depending upon the substrates used. The raw biogas (biomethane) from the biogas (biomethane) digesters is properly processed and purified from the unwanted gases like CO_2, H_2S and moisture upto a certain required level.

While implementing this standard all the regulatory and statutory provisions shall be complied.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

BIOGAS (BIOMETHANE) — SPECIFICATION

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for the biogas (biomethane) applications in stationary engines, automotive and thermal applications and supply through piped network.

2 REFERENCES

The following standards contain provisions which through reference in this text constitute the provisions of the standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standard indicated below:

IS No./ International Standard	*Title*
1070 : 1992	Reagent grade water (*third revision*)
7285 (Part 2) : 2004	Refillable seamless steel gas cylinders: Part 2 Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa (112 kgf/mm^2)
15125 : 2002/ ISO 10715 : 1997	Natural gas — Sampling guidelines
15130 (Part 3) : 2002/ ISO 6974-3 : 2000	Natural gas — Determination of composition with defined uncertainty by gas chromatography: Part 3 Determination of hydrogen, helium, oxygen, nitrogen, carbon dioxide and hydrocarbons up to C_8 using two packed columns
15319 : 2003/ ISO 13734 : 1998	Natural gas — Organic sulphur compounds used as odorants — Requirements and test methods
15320 : 2003/ ISO 15403 : 2000	Natural gas — Designation of the quality of natural gas for use as a compressed fuel for vehicles
15490 : 2004	Cylinders for on-board storage of compressed natural gas as a fuel for automotive vehicles
15641 (Part 2) : 2006/ ISO 10101-2 : 1993	Natural gas — Determination of water by Karl Fischer method: Part 2 Titration procedure
ISO 6326-3 : 1989	Natural gas — Determination of sulphur compounds: Part 3 Determination of hydrogen sulphide, mercaptan sulphur and carbonyl sulphide sulphur by potentiometry
ISO 14532 : 2001	Natural gas — Vocabulary

3 TERMINOLOGY

For the purpose of this standard, the definitions given in ISO 14532 shall apply.

4 REQUIREMENTS

4.1 Biogas (biomethane) shall be free from liquids over the entire range of temperatures and pressures encountered in the storage and dispensing system, fuel containers, engine and fuel system and piped network.

4.2 The biogas (biomethane) fuel shall be free from particulate matter such as dust, dirt and mist.

4.3 Odour

Biogas (biomethane) delivered to any vehicle, stationary engine or piped network, shall be odorized similar to a level found in the local distribution (*see* IS 15319).

4.4 The biogas (biomethane) for automotive application and piped network shall also comply with the requirements given in Table 1 when tested in accordance with the methods given in col 4 of Table 1.

Table 1 Requirements for Biogas (Biomethane)

Sl No. (1)	**Characteristic** (2)	**Requirements** (3)	**Method of Test, Ref to** (4)
i)	CH_4, percent, *Min*	90	IS 15130 (Part 3)
ii)	Moisture, mg/m^3, *Max*	16	IS 15641 (Part 2)
iii)	H_2S, mg/m^3, *Max*	30.3	ISO 6326-3
iv)	$CO_2+N_2+O_2$, percent, *Max* (*v/v*)	10	IS 15130 (Part 3)
v)	CO_2, percent, *Max* (*v/v*) (when intended for filling in cylinders)	4	IS 15130 (Part 3)
vi)	O_2, percent, *Max* (*v/v*)	0.5	IS 15130 (Part 3)

This biogas (biomethane) may also be used for applications such as stationary engines or power generators.

5 SUPPLY OF BIOGAS (BIOMETHANE)

5.1 Biogas (biomethane) shall be stored and transported through cylinders conforming to IS 7285 (Part 2). For automotive use, it shall be filled in cylinders conforming to IS 15490.

5.2 It may be transported through piped network or injected into existing system of pipelines as per regulatory requirements.

6 SAMPLING

Proper sampling of biogas (biomethane) is extremely important, if the tests are to be significant. Samples of biogas (biomethane) are examined by various test methods to determine physical and chemical characteristics. The test results are often used for custody transfer. It is, therefore, essential that the samples be representative of the product to be tested. The representative samples of biogas (biomethane) shall be drawn as prescribed under IS 15125.

7 QUALITY OF REAGENTS

Unless specified otherwise, pure chemicals and distilled water shall be used in tests (*see* IS 1070).

NOTE — Pure chemicals shall mean chemicals that do not contain impurities which affect the result of the analysis.

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Amendments Issued Since Publication

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